

ABSTRACT OF THE DISCLOSURE

The present invention provides methods and apparatus for performing biological reactions on a substrate surface that use a low volume of sample fluid, accommodate substrates as large as or larger than a conventional microscope slide, accommodate a plurality of independent reactions, and accommodate a substrate surface having one or more hydrogel-based microarrays attached thereto. The invention further provides an apparatus that allows introduction of fluids in addition to sample fluid into each reaction chamber via standard pipet tips and associated pipettor apparatus. The invention further provides an apparatus that increases reaction reproducibility, increases reaction efficiency, and reduces reaction duration.

The preferred embodiment of the invention is configured to accommodate a standard microscope slide substrate having four hydrogel-based microarrays attached thereto and comprises a base plate having a well structure corresponding to each microarray and two fluid ports extending through the base plate into each well structure, a means for temporarily clamping the substrate against the base plate such that the microarrays face into the well structures, a means for sealing the perimeter around each microarray and well structure, and a means for sealing the fluid ports from the environment.